Jan. 7, 1958 G. O. LEGGETT 2,818,691

ABRASIVE WHEEL

Filed April 18, 1955

Fig. 1.

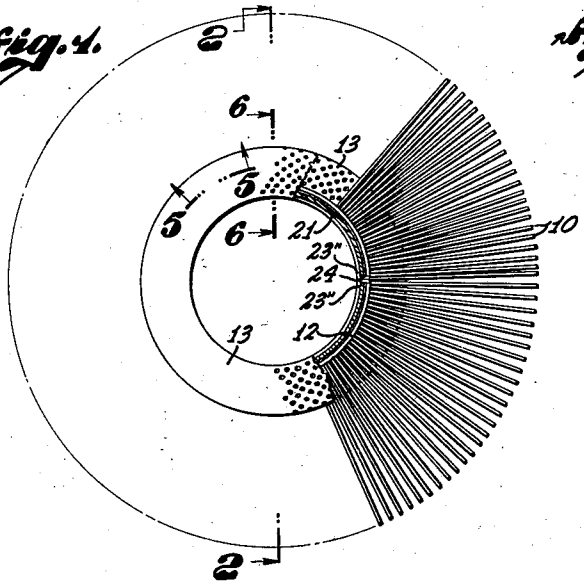

Fig. 2.

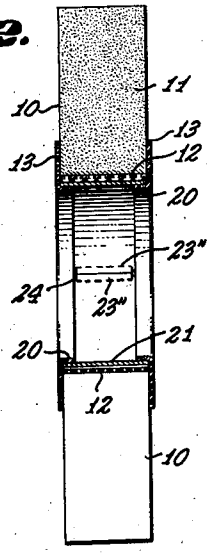

Fig. 3.

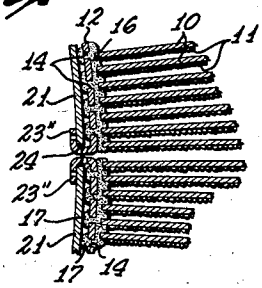

Fig. 4.

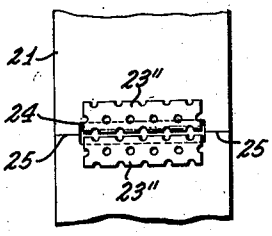

Fig. 7.

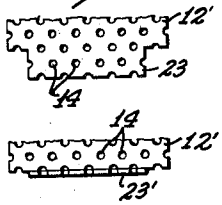

Fig. 8.

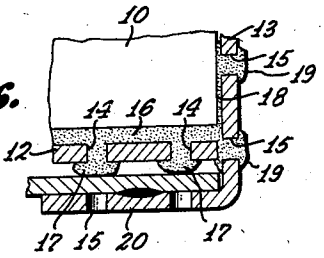

Fig. 5.

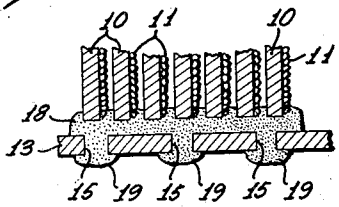

Fig. 6.

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ABRASIVE WHEEL

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8 Claims. (Cl. 51—193.5)

This invention relates to abrasive wheels of the type utilizing a plurality of abasive coated flexible leaves anchored at their inner edges to a tubular hub and radiating therefrom in circumferentially spaced annular array. The general object of the invention is to provide such an abrasive wheel of improved sturdiness and durability.

Specifically, the invention contemplates an abrasive wheel wherein the abrasive coated leaves are anchored to an anchor sleeve of perforated sheet material which may be, and preferably is, of sheet metal, with a high degree of tensile strength and fairly rigid, and wherein the leaves are attached thereto by an annular film of bonding material portions of which project into or through the perforations in the anchor sleeve and other portions of which project around the inner edges of the leaves and into the crevices between the leaves at said inner edges, so as to provide an exceedingly sturdy bond between the sleeve and the inner edges of the leaves.

Other objects will become apparent in the ensuing specifications and appended drawing in which:

Fig. 1 is a side view of an abrasive wheel embodying the invention;

Fig. 2 is a sectional view thereof, taken through the axis of wheel, as indicated by line 2—2 of Fig. 1;

Fig. 3 is a fragmentary enlarged detail sectional view showing the joint between the ends of the strip composing the anchor sleeve;

Fig. 4 is a fragmentary detail view looking at the inside of the anchor sleeve, at the joint therein;

Fig. 5 is a fragmentary enlarged detail sectional view taken on line 5—5 of Fig. 1;

Fig. 6 is a fragmentary enlarged detail sectional view taken on line 6—6 of Fig. 1;

Figs. 7 and 8 are fragmentary details of an end of the anchor strip, in intermediate stages of fabrication.

Referring now to the drawings in detail, I have shown therein, as an example of one form in which the invention may be embodied, an abrasive wheel comprising a plurality of rectangular leaves 10 of flexible sheet material, such as cloth fabric, kraft paper or sheet plastic, each having one face coated with abrasive grains 11 secured by a suitable cement, in accordance with well known practice in the production of sandpaper, emery cloth, etc. Leaves 10 are anchored at their inner ends in a hub assembly comprising an anchor sleeve 12 and a pair of face binding rings 13, and project therefrom in radial planes with reference to the axis of rotation of the wheel, with which the sleeve 12 and rings are coaxial. The inner edges of the leaves 10 are parallel to the axis of rotation and are uniformly spaced about the circumference of anchor sleeve 12, to provide an annular array of abrasive leaves in which the abrasive coatings all face in a common circumferential direction. The coating 11 of each leaf 10 is directly adjacent the uncoated back face of an adjoining leaf 10.

Anchor sleeve 12 and face binding rings 13 are of perforated stiff sheet material such as sheet metal, having a large number of small perforations 14 and 15 respectively. A cylindrical film 16 of cement is attached to the inner surface of anchor sleeve 12, portions 17 thereof projecting through perforations 14 to securely anchor the film to the sleeve. Annular films 18 of cement are attached to the inner faces of binding rings 13, portions 19 thereof projecting through perforations 15. The inner edges of leaves 10 are embedded in film 16 and the respective side edges thereof are embedded in side films 18. The grip of films 16 and 18 against the respective edges of the leaves 10 is adequate to anchor the leaves against the pull of centrifugal force when the wheel is rotating at high speed, and to resist the circumferential drag imposed on the leaves by a surface being ground or buffed.

The rings 13 are of angle section, each being provided with a cylindrical pilot flange 20 extending axially from its inner margin into a respective end of a hub sleeve 21 which is disposed as a liner within anchor sleeve 12. This piloting telescoping of flanges 20 into hub sleeve 21 establishes an accurately coaxial relation between binding rings 13, anchor ring 12 and the annular array of abrasive coated leaves 10. This is extremely important in order to avoid destructive unbalance in the rotating wheel.

Anchor sleeve 12 is initially formed as a straight strip of perforated ribbon stock, with end portions corner-notched to provide narrowed tongues 23 (Fig. 7) which are bent at right angles as shown at 23′ in Fig. 8, for insertion in a slot 24 in hub sleeve 21. When the bent tongues 23′ of both ends of the strip have been inserted in slot 24, they are spread apart, bent circumferentially away from one another at 23″, and flattened against the inner face of hub sleeve 21, thus locking the anchor sleeve to the hub sleeve. The hub sleeve 21 is circumferentially continuous past the ends of slot 24. It may be fabricated as a short section of seamless tubing, with the slot 24 lanced therein, or it may be fabricated from a strip of ribbon stock, its ends notched to provide respective halves of slot 24, and leaving projecting tabs which are butt welded at 25 after coiling the strip into a ring.

The wheel is fabricated and assembled, using my improved method wherein the hub ring 21 is fabricated as one unit, and the anchor strip 12′, with leaves 10 attached thereto at their inner edges, is fabricated as a separate unit which is then attached to the hub sleeve. The leaves 10, cut to uniform length from a roll of abrasive coated ribbon, are stacked on the flat anchor strip 12′, previously coated with cement and supported on a horizontal surface, and the weight of the leaves causes their lower edges to sink into the cement film on the anchor strip. The leaves are held in upstanding positions, with their side edges accurately aligned, by a suitable assembly jig. They are allowed to remain supported in the jig until the cement has thoroughly hardened around their lower edges. The assembly of leaves and anchor strip is then coiled around the hub sleeve 21, and is stretched around the hub sleeve to bring the tongues 23′ into registry with slot 24. The tongues are then inserted into the slot 24, are grasped from inside the hub sleeve, and are pulled tight to complete the operation of wrapping the anchor sleeve snugly against the hub sleeve. The tongues 23′ are then spread to become the clincher tongues 23.″

The rings 13, after being coated with cement, are then inserted into the respective ends of the hub sleeve and secured by the adhesive attachment to leaves 10.

Since the anchor sleeve 12 is formed of fairly rigid sheet material having a high degree of tensile strength, the hub ring 21 may be omitted, if desired.

I claim:

1. In an abrasive wheel: a plurality of abrasive coated leaves arranged with their inner edges parallel to a com-

mon axis of rotation of said wheel and uniformly spaced circumferentially in a closed cylindrical array encircling and coaxial with said axis; an anchor sleeve of sheet material having a large number of small perforations peripherally conforming to said cylindrical array encircled by said inner edges; a cylindrical film of bonding medium having portions thereof projecting into said perforations and having other portions extending past said inner edges and into spaces between adjoining leaves; and flat face binding rings engaging the respective side edges of said leaves and joined to said anchor sleeve at their inner margins.

2. An abrasive wheel as defined in claim 1, wherein said face binding rings are of sheet material having a large number of small perforations therein; and including side films of bonding material including portions thereof extending into the perforations of said side binding rings and other portions thereof extending into the spaces between adjacent leaves along the side edges thereof.

3. An abrasve wheel as defined in claim 2, including an endless cylindrical hub sleeve fitted within said anchor sleeve and having a transverse slot, closed at both ends; said anchor sleeve having circumferentially terminal portions projecting radially inwardly through said slot, spread apart circumferentially, and engaging the inner face of said hub sleeve to securely lock said terminal portions to the hub sleeve.

4. An abrasive wheel as defined in claim 3, wherein said face binding rings are of angle section, each including a cylindrical pilot flange snugly telescoped within a respective end portion of said hub sleeve.

5. An abrasive wheel as defined in claim 1, including an endless cylindrical hub sleeve fitted within and secured to said anchor sleeve, and wherein said face binding rings are of angle section, each including a cylindrical pilot flange snugly telescoped within a respective end portion of said hub sleeve.

6. In an abrasive wheel: a plurality of abrasive coated leaves arranged with their inner edges parallel to a common axis of rotation of said wheel and uniformly spaced circumferentially in a closed cylindrical array encircling and coaxial with said axis; an anchor sleeve of sheet material having a large number of small perforations peripherally conforming to said cylindrical array encircled by said inner edges; a cylindrical film of bonding medium having portions thereof projecting into said perforations and having other portions extending past said inner edges

and into spaces between adjoining leaves; and flat face binding rings engaging the respective side edges of said leaves and joined to said anchor sleeve at their inner margins; an endless cylindrical hub sleeve fitted within said anchor sleeve and having a transverse slot, closed at both ends; said anchor sleeve having circumferentially terminal portions projecting radially inwardly through said slot, spread apart circumferentially, and engaging the inner face of said hub sleeve to securely lock said terminal portions to the hub sleeve; said face binding rings being of angle section, each including a cylindrical pilot flange snugly telescoped within a respective end portion of said hub sleeve, extending substantially to the ends of said slot, and secured to said hub sleeve to reinforce the portions thereof lying outwardly of said slot ends.

7. An abrasive wheel as defined in claim 6, wherein said face binding rings are of sheet material having a large number of small perforations therein; and including side films of bonding material including portions thereof extending into the perforations of said side binding rings and other portions thereof extending into the spaces between adjacent leaves along the side edges thereof.

8. In an abrasive wheel: a plurality of abrasive coated leaves arranged with their inner edges parallel to a common axis of rotation of said wheel and uniformly spaced circumferentially in a closed cylindrical array encircling and coaxial with said axis; an anchor sleeve of sheet material having a large number of small perforations peripherally conforming to said cylindrical array encircled by said inner edges; a cylindrical film of bonding medium having portions thereof projecting into said perforations and having other portions extending past said inner edges and into spaces between adjoining leaves; an endless cylindrical hub sleeve fitted within said anchor sleeve and having a transverse slot, closed at both ends; said anchor sleeve having circumferentially terminal portions projecting radially inwardly through said slot, spread apart circumferentially, and engaging the inner face of said hub sleeve to securely lock said terminal portions to the hub sleeve.

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